Claims

What is claimed is:

1. A method for obtaining an engineered β-ketoacyl-ACP synthase having an altered substrate specificity with respect to the acyl-ACP substrates utilized by said β-ketoacyl-ACP synthase, wherein said method comprises:

    a) modifying a gene sequence encoding a first β-ketoacyl-ACP synthase protein to produce a modified β-ketoacyl-ACP synthase gene sequence, wherein said modified sequence encodes an engineered β-ketoacyl-ACP synthase having at least one substitution, insertion or deletion of one or more amino acid residues in the mature portion of said first β-ketoacyl-ACP synthase, and

    b) expressing said modified gene sequence in a host cell, whereby said engineered β-ketoacyl-ACP synthase is produced.

2. The method of claim 1 further comprising the step of assaying said engineered β-ketoacyl-ACP synthase to detect altered substrate specificity.

3. The method according to claim 1 wherein said at least one amino acid substitution, insertion or deletion is in a position selected from the group consisting of residue 105 - 120, 130 - 140, 190 - 200 and 340 - 400 of a β-ketoacyl-ACP synthase protein.

4. An amino acid sequence encoding a β-ketoacyl-ACP synthase protein wherein said sequence has at least one substitution, insertion or deletion of at least one amino acid residue and said protein has an altered substrate specificity.

5. The amino acid sequence of claim 4, wherein said amino acid sequence is obtained from a prokaryotic source.

6. The amino acid sequence of claim 4, wherein said amino acid sequence is obtained from *E.coli.*

7. The amino acid sequence of claim 4, wherein said amino acid sequence is obtained from a plant source.

8. An amino acid sequence encoding a β-ketoacyl-ACP synthase protein wherein said sequence has at least one substitution, insertion or deletion of at least one amino acid residue selected from the group consisting of residue 105 - 120, 130 - 140, 190 - 205 and 340 - 400.

9. The amino acid sequence of claim 8, wherein said amino acid sequence is obtained from *E.coli.*

10. The amino acid sequence of claim 9 wherein said at least one amino acid substitution, insertion or deletion is in a position selected from the group consisting of residue 108, 111, 113, 114, 133, 138, 193, 197, and 203.

11. The amino acid sequence of claim 8, wherein said amino acid sequence is obtained from a plant source.

12. The amino acid sequence of claim 11 wherein said at least one amino acid substitution, insertion or deletion is in a position selected from the group consisting of residue 110, 113, 115, 116, 134, 139, 198, and 204.

13. A nucleic acid construct comprising as operably linked components in the 5' to 3' direction of transcription:

a transcriptional initiation region; and

a polynucleotide sequence encoding a β-ketoacyl-ACP synthase having an altered substrate specificity.

14. The nucleic acid construct of claim 13, wherein said β-ketoacyl-ACP synthase has a engineered hydrophobic fatty acid binding pocket.

15. The nucleic acid construct of claim 13, wherein said β-ketoacyl-ACP synthase has been mutated in a region corresponding to an amino acid selected from the group consisting of residue 105 - 120, 130 - 140, 190 - 200 and 340 - 400.

16. A method for altering the fatty acid composition of a host cell comprising;

transforming a host cell with a nucleic acid expression construct comprising a transcription initiation region, and a nucleic acid sequence encoding a β-ketoacyl-ACP synthase having altered substrate specificity, and

growing said host cell under appropriate culture conditions such that the fatty acid composition is altered in said host cell.